NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550 MIDTERM EXAM I 10/92 Po

- This exam is open book and notes.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be *sure* to include units in your answers.
- Please circle or underline your answers.
- Do *NOT* do any work on this sheet.
- Show *ALL* work.

1	
2	
3	
Total	

Name: _____

1. Consider an 8/125 single–mode fiber with $n_2 = 1.450$ and $\Delta = 0.3\%$. The source operates at 1320 nm with a linewidth of 50 nm. Calculate the ratio if the waveguide dispersion delay Δ_{wg} to the material dispersion delay Δ_{mat}.

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2. A certain laser, operating at 1550 nm, is predicted to have its power output fall to one–half of its initial value after 5 years of operation.

   This laser is attached to a fiber link that has 30 km of fiber with a fiber loss of 0.8 dB/km. (All other losses are negligible.) If the power into the fiber at the transmitter end is 800 μW when the link is first put into operation, calculate power level at the receiver end of the fiber *(in units of μW)* after 12 years of operation.

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3. Dynamic fatigue testing of fiber samples reveals that the stress corrosion parameter of a fiber, n, has a value of 30.

   Lifetime prediction analysis shows that a piece of the fiber, prooftested at 250 MN·m^{-2} has a predicted lifetime of 10^5 seconds at a stress level of 100 MN·m^{-2}.

   Calculate the prooftest level required *(in terms of the fiber strain)* to ensure a fiber lifetime of 1 year at a stress level of 200 MN·m^{-2}.